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ART UNIT	PAPER NUMBER
2157	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

	Application No.		Applicant(s)	
Office Action Summary	09/460,898		MATSUOKA ET AL.	
	Examiner		**Art Unit**	
	Christian La Forgia		2157	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>30 March 2000</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-35</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-35</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>14 December 1999</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

        1.☒ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____ .

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)   4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)   5) ☐ Notice of Informal Patent Application (PTO-152)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>5</u> .   6) ☐ Other: .

DETAILED ACTION

1.   The preliminary amendment filed on 30 March 2000 is noted and made of record.

2.   Claims 1 through 35 are presented for examination.

Drawings

3.   This application has been filed with informal drawings which are acceptable for

examination purposes only. Formal drawings will be required when the application is allowed.

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making
> and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it
> pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode
> contemplated by the inventor of carrying out his invention.

5.   Claim 29 is rejected under 35 U.S.C. 112, first paragraph, because the best mode

contemplated by the inventor has not been disclosed. Evidence of concealment of the best mode

is based upon failure to discuss the improvements in the specification made by the claim.

6.   Claim 30 is rejected under 35 U.S.C. 112, first paragraph, because the best mode

contemplated by the inventor has not been disclosed. Evidence of concealment of the best mode

is based upon failure to discuss the improvements in the specification made by the claim.

7.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the
> subject matter which the applicant regards as his invention.

8.   Claims 7 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite

for failing to particularly point out and distinctly claim the subject matter which applicant

regards as the invention.

9. As claim 7 is written "those pieces of formation" is being interpreted as "those pieces of information " for the purpose of examination.

10. As claim 26 is written "[the] scheduling processing unit has priority patterns in such a random array that LSB/MSB of binary notation permutation layout patterns as the above priority patterns" is being interpreted as "the scheduling processing unit arranges the above priority pattern based on the random assortment of LSB/MSB binary layout patterns" for the purpose of examination.

11. Appropriate action is required.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

13. Claims 1 through 7, 10 through 15, 17 through 28, and 31 through 35 are rejected under 35 U.S.C. 102(e) as being anticipated by United States Patent No. 6,262,986 to Oba et al., (hereinafter Oba).

14. As per claim 1, Oba teaches a scheduling control system comprising:

15. a request information management unit for holding forwarding request information on each input line as a scheduling target with respect to a desired output line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

16.   an inter-highway pointer control unit for indicating a start of scheduling input line

(Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column

10, line 3);

17.   an intra-highway pointer control unit for indicating a start of retrieval output line in the

forwarding request information corresponding to each input line (Figures 1, 2, 4, 5A, & 5B;

column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3); and,

18.   a scheduling processing unit for starting the retrieval of the output lines from the output

line indicated by the intra-highway pointer control unit from the forwarding request information,

selecting the output line unselected by other input lines, performing the scheduling for all the

input lines in sequence from the input line indicated by the inter-highway pointer control unit,

and updating each start-of-retrieval output line indicated by the intra-highway pointer control

unit at a next scheduling cycle (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53;

column 7, line 1 to column 10, line 3).

19.   Regarding claim 2, Oba teaches a scheduling control system comprising:

20.   a request information management unit for holding forwarding request information on

each input line as a scheduling target with respect to a desired output line (Figures 1, 2, 4, 5A, &

5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

21.   an inter-highway pointer control unit for indicating a start-of-scheduling output line

(Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column

10, line 3);

22.   an intra-highway pointer control unit for indicating a start-of-retrieval input line in the

forwarding request information corresponding to each input line (Figures 1, 2, 4, 5A, & 5B;

column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3); and,

23.   a scheduling processing unit for starting the retrieval of the input lines from the input line

indicated by the intra-highway pointer control unit from the forwarding request information,

selecting the input line that is not ensured by other output lines, performing the scheduling for all

the output lines in sequence from the output line indicated by the inter-highway pointer control

unit, and updating each start-of-retrieval input line indicated by the intra-highway pointer control

unit at a next scheduling cycle (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53;

column 7, line 1 to column 10, line 3).

24.   With regards to claim 3, Oba teaches the scheduling processing unit updates an inter-

highway pointer to a next adjacent line per scheduling cycle, and updates an intra-highway

pointer to a next line adjacent to the line with forwarding determined (Figures 8A, 8B, 8C, & 8D;

column 12, line 44 to column 13, line 25).

25.   As per claim 4, Oba teaches the scheduling processing unit updates an inter-highway

pointer to a line next to the line with the forwarding established at first within the scheduling

cycle, and updates an intra-highway pointer to a next line adjacent to the line with the forwarding

determined (Figures 8A, 8B, 8C, & 8D; column 12, line 44 to column 13, line 25).

26.   Regarding claim 5, Oba teaches the scheduling processing unit, if the request information

exists in the line indicted by the intra-highway pointer and this line is used by other lines, does

not update the intra-highway pointer (Figures 8A, 8B, 8C, & 8D; column 12, line 44 to column

13, line 25).

27.   Concerning claim 6, Oba teaches a scheduling control system comprising:

28.   a request information management unit for holding forwarding request information on

each input line as a scheduling target with respect to a desired output line (Figures 1, 2, 4, 5A, &

5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

29.   an inter-highway pointer control unit for holding an inter-highway pointer for indicating a

start-of-scheduling input line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53;

column 7, line 1 to column 10, line 3);

30.   an intra-highway pointer control unit for holding an intra-highway pointer for indicating a

start-of-retrieval output line in the forwarding request information corresponding to each input

line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to

column 10, line 3);

31.   a request management control unit for holding forwarding request information to a

desired output line (Figure 3; column 7, line 49 to column 8, line 29); and,

32.   a scheduling processing unit for starting the retrieval of the output lines from the output

line indicated by the intra-highway pointer control unit from plural pieces of the forwarding

request information, and selecting the output line unselected by other input lines, the scheduling

processing unit alternately executing, when updating the inter-highway pointer after finishing the

scheduling to an adjacent line, a process of updating to an adjacent line in a forward direction per

scheduling cycle, and a process of updating to an adjacent line in a reverse direction (Figures 1,

2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3).

33.   As per claim 7, the scheduling processing unit includes:

34.   means for dividing, when selecting the forwarding request information corresponding to

each line as a scheduling target, the forwarding request information into two pieces of

information before and after the intra-highway pointer, and obtaining the lines having lowest

numbers based on a low number selection logic from those pieces of information (Figures 8A,

8B, 8C, & 8D; column 12, line 44 to column 13, line 25); and,

35.   means for obtaining a final forwarding line number from the obtained two lower number

lines with a priority given to a result after the intra-highway pointer (Figures 8A, 8B, 8C, & 8D;

column 12, line 44 to column 13, line 25).

36.   As per claim 10, Oba teaches a scheduling control system comprising:

37.   a request information management unit for holding forwarding request information on

each input line as a scheduling target with respect to a desired output line (Figure 3; column 7,

line 49 to column 8, line 29);

38.   an inter-highway pointer control unit for holding an inter-highway pointer for indicating a

start-of-scheduling input line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53;

column 7, line 1 to column 10, line 3);

39.   an intra-highway pointer control unit for holding an intra-highway pointer for indicating a

start-of-retrieval output line in the forwarding request information corresponding to each input

line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to

column 10, line 3);

40.   a request management control unit for holding forwarding request information to a

desired output line (Figure 3; column 7, line 49 to column 8, line 29); and,

41.   a scheduling processing unit for starting the retrieval of the output lines from the output

line indicated by the intra-highway pointer control unit from plural pieces of the forwarding

request information, and selecting the output line unselected by other input lines (Figures 1, 2, 4,

5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3),

42.   wherein the scheduling processing unit further includes a load observing unit for counting

the number of packets arrived within a fixed cycle per logical forwarding request information of

each input line, and performs the scheduling of a next cycle in accordance with the number of

packets counted by the load observing unit (Figures 3, 8A, 8B, 8C, & 8D; column 7, line 49 to

column 8, line 29; column 12, line 44 to column 13, line 25).

43.   Regarding claim 11, Oba teaches the scheduling processing unit restricts the number of

forwarding permission packets to each output line within the fixed cycle, to the number of

arrived packets to each piece of logical forwarding request information at the previous cycle

(Figures 3, 8A, 8B, 8C, & 8D; column 7, line 49 to column 8, line 29; column 12, line 44 to

column 13, line 25).

44.   Concerning claim 12, Oba teaches the scheduling processing unit determines a rate for

attaining a top priority output line in the scheduling within the fixed cycle in accordance with the

number of arrived packets at the previous cycle (Figures 7, 8A, 8B, 8C, & 8D; column 11, line

22 to column 12, line 3;column 12, line 44 to column 13, line 25).

45.   With regards to claim 13, Oba teaches the scheduling processing unit holds a top priority

forwarding pointer, other than the intra-highway pointer, for determining the line for forwarding

with a top priority in accordance with the number of arrived packets at the previous cycle,

determines the output line in accordance with a rate of the number of arrived packets to each

piece of the forwarding request information in accordance with the top priority forwarding

pointer with respect to the number of all the arrived packets arrived at the input line at the

previous cycle, and executes the scheduling with respect to those excluding the number of all the

arrived packets in accordance with the normal intra-highway pointer (Figures 7, 8A, 8B, 8C, &

8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

46.   As per claim 14, Oba teaches the scheduling processing unit executes, if the packets, of

which the number is the same as the number of arrived packets at the previous cycle, are not

forwarded within a present cycle, a process of carrying over a remaining number of arrived

packets to the number of arrived packets at a next cycle (Figures 7, 8A, 8B, 8C, & 8D; column

11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

47.   Regarding claim 15, Oba teaches the scheduling processing unit determines a rate for attaining a top priority output line in the scheduling within a fixed cycle in accordance with a forwarding request information length at the previous cycle (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

48.   As per claim 17, Oba teaches a scheduling control system comprising:

49.   means for notifying a scheduling processing unit of a quality of service class together with forwarding request information (column 1, lines 19-55);

50.   a scheduling processing unit for executing a scheduling process based on the forwarding request information on a first priority class of each input line in first scheduling, and for executing, with an output line being unestablished in the first scheduling, the scheduling based on the request information on a second priority class (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3),

51.   wherein the scheduling processing unit includes:

52.   a scheduler for performing the scheduling from a higher priority class among two or more classes (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25); and

53.   a buffer for executing band control of the output line determined by the scheduler and intra-group band control (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

54.   As per claim 18, Oba teaches a scheduling control system, wherein the scheduling processing unit further includes notifying means for notifying the buffer of a result of scheduling after the scheduling with respect to the first priority class and a buffer band control unit for controlling the band of the Quality of Service class within the line determined by the scheduler and performing delay priority control (Figures 7, 8A, 8B, 8C, & 8D; column 1, lines 19-55; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25),

55.   the buffer, if within a predetermined band of the Quality of Service class, accepts a result given from the scheduler and forwards data accumulated in the buffer, and, if out of the band, makes the forwarding request information thereof invalid and notifies the scheduler of this purport (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25), and,

56.   the scheduling processing unit thus performs second scheduling (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

57.   Regarding claim 19, Oba teaches a switch comprising:

58.   means for notifying a scheduling processing unit of a quality of service class together with forwarding request information (column 1, lines 19-55);

59.   a scheduling processing unit having a scheduler for executing scheduling in order to determine an output line based on the forwarding request information (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3),

60.   an input buffer for controlling a band of the output line determined by the scheduler (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25);

61.   a band control unit for executing delay and band control of each quality of service class in the output line having a forwarding right determined in the scheduling processing unit, reading packet-formatted data from the buffer if within a predetermind band, and, if out of the predetermined band, notifying the scheduler of a purport that the forwarding request information is invalid without outputting the packet-formatted data from the buffer (Figures 3, 7, 8A, 8B, 8C, & 8D; column 7, line 49 to column 8, line 29; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

62.   As per claim 20, Oba teaches a packet device comprising:

63.   means for notifying a scheduling processing unit of a quality of service class together with forwarding request information (column 1, lines 19-55);

64.   a scheduling processing unit having a scheduler for executing scheduling in order to determine an output line based on the forwarding request information (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3),

65.   a buffer for controlling a band of the output line determined by the scheduler (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25);

66.   wherein the scheduling processing unit analyzes the quality of service class and executing the scheduling for the output line that is within a predetermined band and has a forwarding

request (Figures 3, 7, 8A, 8B, 8C, & 8D; column 7, line 49 to column 8, line 29; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

67.   Regarding claim 21, Oba teaches wherein the scheduling processing unit gives a forwarding right to the forwarding request in an arbitrary off-band quality of service class if unable to obtain the forwarding right in any quality of service classes under the band control (Figures 3, 7, 8A, 8B, 8C, & 8D; column 7, line 49 to column 8, line 29; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

68.   With regards to claim 22, Oba teaches a switch comprising:

69.   means for notifying a scheduling processing unit of a quality of service class together with forwarding request information (column 1, lines 19-55);

70.   a scheduling processing unit having a scheduler for executing scheduling in order to determine an output line based on the forwarding request information (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3),

71.   a buffer, divided in logical output routes, for controlling a band of the output line determined by the scheduler (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25);

72.   an individual counter, provided per line or per quality of service class, for counting leaky buckets with respect to the output line selected by the scheduler (column 11, lines 26-58); and,

73.   a representative counter, provided per line, for counting an elapsed time since the output line has been selected last time (column 11, lines 26-58).

74.   As per claim 23, Oba teaches wherein the representative counter unit includes an internal

timer, each counter holds a time when the selection of the last time is made on the bases of the

internal timer, and obtains the elapsed time by making a comparison with a present time when

the selection is made next time (column 11, lines 26-58).

75.   As per claim 24, Oba teaches a scheduling control system comprising:

76.   a request information management unit for holding forwarding request information on

each input line as a scheduling target with respect to a desired output line (Figures 1, 2, 4, 5A, &

5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

77.   a scheduling processing unit, having N-pieces (N is a natural number equal to or more

than 2) of priority patterns with different selection priorities between the respective output lines,

for selecting the output line unused by other input lines in accordance the priority pattern and the

forwarding request information (Figures 1, 2, 4, 5A, 5B, 7, 8A, 8B, 8C, & 8D; column 4, line 62

to column 6, line 53; column 7, line 1 to column 10, line 3; column 11, line 22 to column 12, line

3;column 12, line 44 to column 13, line 25); and,

78.   a priority pointer control unit for indicating a start number of the priority patterns

(Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to

column 13, line 25),

79.   wherein the scheduling processing unit sequentially performs the scheduling for the N-

patterns from the priority pattern indicated by a priority pointer, and updates the start number of

the priority patterns at a next scheduling cycle (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22

to column 12, line 3;column 12, line 44 to column 13, line 25).

80.   As per claim 25, Oba teaches a scheduling control system comprising:

81.   a request information management unit for holding forwarding request information on

each input line as a scheduling target with respect to a desired output line (Figures 1, 2, 4, 5A, &

5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

82.   a scheduling processing unit, having N-pieces (N is a natural number equal to or more

than 2) of priority patterns with different selection priorities between the respective output lines,

for selecting the output line unused by other input lines in accordance the priority pattern and the

forwarding request information (Figures 1, 2, 4, 5A, 5B, 7, 8A, 8B, 8C, & 8D; column 4, line 62

to column 6, line 53; column 7, line 1 to column 10, line 3; column 11, line 22 to column 12, line

3;column 12, line 44 to column 13, line 25); and,

83.   a priority pointer control unit for indicating a start number of the priority patterns

(Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3; column 12, line 44 to

column 13, line 25),

84.   wherein the scheduling processing unit sequentially performs the scheduling for the N-

patterns from the priority pattern indicated by a priority pointer, and updates the start number of

the priority patterns at a next scheduling cycle (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22

to column 12, line 3; column 12, line 44 to column 13, line 25).

85.   Regarding claim 26, Oba teaches the scheduling processing unit arranges the above

priority pattern based on the random assortment of LSB/MSB binary layout patterns (Figures 7,

8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3; column 12, line 44 to column 13,

line 25).

86.   With regards to claim 27, Oba teaches the scheduling processing unit includes means for

selecting the forwarding line in accordance with the priority indicated by the priority pattern, and

means for making a rotation of a combination of input line numbers and output line numbers

which are different between the respective lines at every scheduling cycle (Figures 7, 8A, 8B,

8C, & 8D; column 11, line 22 to column 12, line 3; column 12, line 44 to column 13, line 25).

87.   As per claim 28, Oba teaches the scheduling processing unit includes a scheduler for

determining a selection candidate within a small group having a plurality of priority patterns

with different selection priorities between all the lines, and an arrangement scheduler for

arranging the candidates selected by the scheduler in accordance with the priorities between all

the lines, and determining the final line (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to

column 12, line 3; column 12, line 44 to column 13, line 25).

88.   As per claim 31, Oba teaches a packet switch comprising:

89.   a request information management unit for holding forwarding request information on

each input line as a scheduling target with respect to a desired output line (Figures 1, 2, 4, 5A, &

5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

90.   an inter-highway pointer control unit for holding an inter-highway pointer for indicating a

start-of-scheduling input line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53;

column 7, line 1 to column 10, line 3);

91.   an intra-highway pointer control unit for holding an intra-highway pointer for indicating a

start-of-retrieval output line in the forwarding request information corresponding to each input

line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to

column 10, line 3);

92.   a request management control unit for holding forwarding request information to a

desired output line (Figure 3; column 7, line 49 to column 8, line 29); and,

93.   a scheduling processing unit for starting the retrieval of the output lines from the output

line indicated by the intra-highway pointer control unit from plural pieces of the forwarding

request information, and selecting the output line unselected by other input lines, (Figures 1, 2, 4,

5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3),

94.   wherein the scheduling processing unit, after allocating the output line numbers to valid

cells coming from the respective input lines, allocates dummy output line numbers for idle cells

to the input lines to which the valid cells are not allocated, and transfers the output line numbers

of the cells coming from all the input lines with different values without any overlaps (Figures 1,

2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3).

95.   As per claim 32, Oba teaches a packet switch comprising:

96.   a request information management unit for holding forwarding request information on each input line as a scheduling target with respect to a desired output line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

97.   a scheduling processing unit, having N-pieces (N is a natural number equal to or more than 2) of priority patterns with different selection priorities between the respective output lines, for selecting the output line unused by other input lines in accordance with the priority pattern and the forwarding request information (Figures 1, 2, 4, 5A, 5B, 7, 8A, 8B, 8C, & 8D; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25); and,

98.   a priority pointer control unit for indicating a start number of the priority patterns (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25),

99.   wherein the scheduling processing unit, sequentially performing the scheduling for the N-patterns from the priority pattern indicated by a priority pointer, and updating the start number of the priority patterns at a next scheduling cycle, simultaneously allocates the output line numbers to the valid cells coming from the respective input lines and allocates dummy output line numbers to idle cells by effecting contention control, and transfers the output line numbers of the cells coming from all the input lines with different values without any overlaps (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3;column 12, line 44 to column 13, line 25).

100.   Regarding claim 33, Oba teaches a packet switching method comprising, in a scheduling

process of updating an inter-highway pointer indicating a start-of-scheduling input line to a next

adjacent input line at every scheduling cycle, and updating an intra-highway pointer indicating a

start-of-retrieval output line to a line adjacent to the line with the forwarding determined on the

basis of forwarding request information corresponding to the input line (Figures 1, 2, 4, 5A, &

5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3), the steps of:

101.   imparting a sequence number to a phase-synchronization-oriented cell transferred from

each input line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line

1 to column 10, line 3);

102.   sequentially incrementing the output line number (Figures 1, 2, 4, 5A, & 5B; column 4,

line 62 to column 6, line 53; column 7, line 1 to column 10, line 3);

103.   shifting the output line number at the same timing between the respective input lines

(Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column

10, line 3); and,

104.   executing phase synchronization at a cell level by comparing a timing of receiving the

phase-synchronization-oriented cell with the sequence number at each lattice point on the switch

side (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to

column 10, line 3).

105.   As per claim 34, Oba teaches a packet switching method comprising, in a scheduling

process of updating an inter-highway pointer indicating a start-of-scheduling input line to a next

adjacent input line at every scheduling cycle, and updating an intra-highway point indicating a

start-of-retrieval output line to a line adjacent to the line with the forwarding determined on the

basis of forwarding request information corresponding to the input line (Figures 1, 2, 4, 5A, &

5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3), the steps of:

106.   transferring in broadcast the cells given the sequence numbers to respective lattice points

within the switch from the respective input lines (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to

column 6, line 53; column 7, line 1 to column 10, line 3); and,

107.   executing phase synchronization at a cell level by comparing the sequence numbers of

the arrived cells at the lattice points within the switch Figures 1, 2, 4, 5A, & 5B; column 4, line

62 to column 6, line 53; column 7, line 1 to column 10, line 3).

108.   With regards to claim 35, Oba teaches a packet switching method comprising, in a

scheduling process of updating an inter-highway pointer indicating a start-of-scheduling input

line to a net adjacent input line at every scheduling cycle, and updating an intra-highway pointer

indicating a start-of-retrieval output line to a line adjacent to the line with the forwarding

determined on the basis of forwarding request information corresponding to the input lines

(Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column

10, line 3), the steps of:

109.   transferring the cells to the respective lattice points within the switch from the input lines

(Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column

10, line 3); and,

110. adjusting a phase difference at a cell level by a phase adjustment buffer provided at each lattice point (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3).

Claim Rejections - 35 USC § 103

111. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

112. Claims 8, 9, 16, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oba in view of United States Patent No. 5,590,123 to Lyles et al., (hereinafter Lyles).

113. As per claim 8, Oba does not teach the scheduling processing units are provided, and the scheduling control system further comprises pipeline processing means for each independently executing pipeline process.

114. Lyles teaches the scheduling processing units are provided, and the scheduling control system further comprises pipeline processing means for each independently executing pipeline process (Abstract; column 3, line 48 to column 4, line 43). Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to include the pipeline processing of Lyles with the scheduling control system of Oba, because it would allow for quicker and more efficient handling of processes or packets.

115. As per claim 9, Oba teaches a scheduling control system comprising:

116.   a request information management unit for holding forwarding request information on

each input line as a scheduling target with respect to a desired output line (Figure 3; column 7,

line 49 to column 8, line 29);

117.   an inter-highway pointer control unit for holding an inter-highway pointer for indicating a

start-of-scheduling input line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53;

column 7, line 1 to column 10, line 3);

118.   an intra-highway pointer control unit for holding an intra-highway pointer for indicating a

start-of-retrieval output line in the forwarding request information corresponding to each input

line (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to

column 10, line 3);

119.   a request management control unit for holding forwarding request information to a

desired output line (Figure 3; column 7, line 49 to column 8, line 29); and,

120.   a scheduling processing unit for starting the retrieval of the output lines from the output

line indicated by the intra-highway pointer control unit from plural pieces of the forwarding

request information, and selecting the output line unselected by other input lines (Figures 1, 2, 4,

5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3).

121.   Oba does not teach wherein the scheduling processing unit further includes a plurality of

pipeline processing means having inter-highway pointer with different start-of-scheduling line

numbers, and

122.   the intra-highway pointer control unit is independently controlled per the pipeline

processing means.

123.   Lyles teaches wherein the scheduling processing unit further includes a plurality of

pipeline processing means having inter-highway pointer with different start-of-scheduling line

numbers (Abstract; column 3, line 48 to column 4, line 43), and

124.   the intra-highway pointer control unit is independently controlled per the pipeline

processing means (Abstract; column 3, line 48 to column 4, line 43). Therefore, it would have

been obvious to one with ordinary skill in the art at the time the invention was made to include

the pipeline processing of Lyles with the scheduling control system of Oba, because it would

allow for quicker and more efficient handling of processes or packets.

125.   With regards to claim 16, Oba does not teach wherein there are constructed extension

units each including the scheduling processing unit per input line, two pieces of I/O ports, a

selector unit for switching over an external I/O and an internal ring-connection, and a delay unit

capable of changing a forwarding delay quantity to an extension output, and,

126.   the extension units are ring-connected.

127.   Lyles teaches wherein there are constructed extension units each including the scheduling

processing unit per input line, two pieces of I/O ports, a selector unit for switching over an

external I/O and an internal ring-connection, and a delay unit capable of changing a forwarding

delay quantity to an extension output (Figures 1A, 1B, & 5; column 3, line 49 to column 6, line

8; column 10, lines 9-61), and,

128.   the extension units are ring-connected (Figures 1A, 1B, & 5; column 3, line 49 to column

6, line 8; column 10, lines 9-61). It would have been obvious to one with ordinary skill in the art

to include the extension units of Lyles with the control system of Oba, because it would allow a

quicker and more efficient manner in which to add peripherals to the control system.

129.   As per claim 29, Oba teaches a packet switch comprising:

130.   sorters each serving as a unit sorter for sorting input cells coming from m-lines of input

routes and transferring the sorted input cells to m-lines of output routes, the packet switch being

constructed by connecting the unit sorters at multi-stages (Figures 7, 8A, 8B, 8C, & 8D; column

11, line 22 to column 12, line 3; column 12, line 44 to column 13, line 25),

131.   wherein outputs per the unit sorter of a first-stage unit sorter group are outputted

separately to a dummy sorter provided at a second stage and the unit sorter at the second stage

(Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12, line 3; column 12, line 44 to

column 13, line 25), and,

132.   outputs of the second-stage dummy sorter and of the second-stage unit sorter are inputted

to a third-stage unit sorter group (Figures 7, 8A, 8B, 8C, & 8D; column 11, line 22 to column 12,

line 3; column 12, line 44 to column 13, line 25).

133.   Oba does not teach N-input/N-output sorter network is configured on the whole by

connecting (2N/m-1)* N/m pieces of the unit sorters.

134.   Lyles teaches N-input/N-output sorter network is configured on the whole by connecting

(2N/m-1)* N/m pieces of the unit sorters (Figures 1A, 1B, & 6; column 8, line 8 to column 10,

line 6). Therefore, it would have been obvious to one with ordinary skill in the art at the time the

invention was made to include the sorters of Lyles with the switching device of Oba, because it

would reduce the amount of hardware per device, making the switching quicker.

135.   Regarding claim 30, Oba teaches a packet switch comprising:

136.   sorters each serving as a unit sorter for sorting input cells coming from m-lines of input routes and transferring the sorted input cells to N-lines of output routes, the packet switch beinc constructed by connecting the unit sorters at multi-stages in matrix X- and Y-directions (Figures 1, 2, 4, 5A, & 5B; column 4, line 62 to column 6, line 53; column 7, line 1 to column 10, line 3).

137.   Oba does not teach wherein outputs of the respective unit sorters are inputted to next-stage unit sorters positioned in (+)X- and (-)Y-directions of the unit sorter,

138.   when extending the sorter group, the outputs of the respective unit sorters are inputted next-stage unit sorters positioned in the (+)X-direction of the unit sorter, and

139.   N-input/N-output sorter network is configured on the whole by connecting N/m*(N/m+1)/2 pieces of the unit sorters.

140.   Lyles teaches wherein outputs of the respective unit sorters are inputted to next-stage unit sorters positioned in (+)X- and (-)Y-directions of the unit sorter (Figures 1A, 1B, 6, 10A, 10B, 10C, 10D, 10E, 10F, 10G, 10H, 10I, & 10J; column 8, line 8 to column 10, line 6),

141.   when extending the sorter group, the outputs of the respective unit sorters are inputted next-stage unit sorters positioned in the (+)X-direction of the unit sorter (Figures 1A, 1B, 6, 10A, 10B, 10C, 10D, 10E, 10F, 10G, 10H, 10I, & 10J; column 8, line 8 to column 10, line 6), and

142.   an N-input/N-output sorter network is configured on the whole by connecting N/m*(N/m+1)/2 pieces of the unit sorters (Figures 1A, 1B, 6, 10A, 10B, 10C, 10D, 10E, 10F, 10G, 10H, 10I, & 10J; column 8, line 8 to column 10, line 6). Therefore, it would have been obvious to one with ordinary skill in the art at the time the invention was made to include the

sorters of Lyles with the switching device of Oba, because it would reduce the amount of

hardware per device, making the switching quicker.

Claim Objections

143.   Claim 14 is objected to under 37 CFR 1.75(c) as being in improper form because a

multiple dependent claim 13. See MPEP § 608.01(n). Accordingly, the claim 14 not been

further treated on the merits.

144.   Applicant is advised that should claim 1 be found allowable, claims 2, 6, 9, and 10 will

be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in

an application are duplicates or else are so close in content that they both cover the same thing,

despite a slight difference in wording, it is proper after allowing one claim to object to the other

as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

145.   Applicant is advised that should claim 19 be found allowable, claim 20 will be objected

to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an

application are duplicates or else are so close in content that they both cover the same thing,

despite a slight difference in wording, it is proper after allowing one claim to object to the other

as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

146.   Applicant is advised that should claim 24 be found allowable, claims 25 and 32 will be

objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an

application are duplicates or else are so close in content that they both cover the same thing,

despite a slight difference in wording, it is proper after allowing one claim to object to the other

as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Conclusion

147.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

148.   The following patents are cited to further show the state of the art with respect to

scheduling control systems, such as:

United States Patent No. 5,509,001 to Tachibana et al., which is cited to show an

apparatus and method for controlling cells input to an ATM network.

149.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Christian La Forgia whose telephone number is (703) 305-7704.
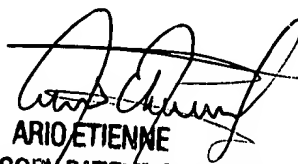
The examiner can normally be reached on Monday thru Thursday 7-5.

150.   If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Ario Etienne can be reached on (703) 308-7562. The fax phone numbers for the

organization where this application or proceeding is assigned are (703) 746-7240 for regular

communications and (703) 746-7239 for After Final communications.

151.   Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is (703) 305-3900.

Christian LaForgia
Patent Examiner
Art Unit 2157

clf
November 6, 2002

ARIO ETIENNE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100